

# **Wetland Restoration and Compensatory Mitigation Plan**

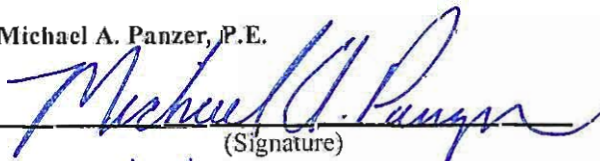
**For**

**Mr. Gerry Henkemeyer  
Henkemeyer Demolition Landfill, Inc.  
P.O. Box 394  
Sauk Rapids, MN 56379**

**September 2006  
Revised July 2007  
Revised October 2007  
Revised November 2007  
Revised February 2008\***

I hereby certify that this plan was prepared by me or  
under my direct supervision and that I am a duly  
registered professional engineer under the laws of the  
State of Minnesota.

Michael A. Panzer, P.E.

  
(Signature)

Date: 11/21/07 Reg. No. 15288

\*This document contains revisions made by consent and agreement of the parties on  
February 13, 2008. The revisions do not constitute substantive change to the engineered  
aspects of this plan.

Appendix A

to the Consent Decree

# Wetland Restoration and Compensatory Mitigation Plan

## Table of Contents

<u>Section</u>	<u>Section Title</u>	<u>Page</u>
	<b>Certification</b>	
<b>1.</b>	<b>Introduction and Purpose</b>	<b>1</b>
1.a	Plan Summary	1
1.b	Restoration and Compensatory Mitigation Activities	2
1.c	Restoration Progress in 2005 to 2007	3
<b>2.</b>	<b>Description of Wetland Restoration, Preservation Areas and Vegetation Management Plan</b>	<b>4</b>
2.a	Wetland Restoration Plan	4
2.b	Wetland Preservation/Enhancement Mitigation	5
2.c	Preservation Plan	6
2.d	Contingency Plan	7
2.e	Sedge Meadow Seeding Specifications	7
<b>3.</b>	<b>Baseline Conditions</b>	<b>8</b>
3.a	Current Topography	8
3.b	Summary of Historic and Current Land Uses	9
3.c	Description of Adjacent Land Uses	9
3.d	Historic and Archeological Reserves	9
3.e	Assessment of Site Geology and Soils	10
3.f	Description of Hydrology and Groundwater	10
3.g	Description of Vegetation Present	11
3.h	Description of Wildlife Present	11
3.i	National Wetland Inventory Mapping	12
3.j	Baseline Wetland Delineations	12
3.k	Minnesota Public Waters Inventory (PWI) Waters	12
3.l	100-year Floodplain	12
3.m	Upland Natural Areas and Potential Green Corridors	13
<b>4.</b>	<b>Fill Removal and Wetland Restoration</b>	<b>13</b>
<b>5.</b>	<b>Performance Standards and Success Criteria</b>	<b>14</b>
5.a	Wetland Restoration Area	14
5.b	Wetland and Upland Mitigation Areas	15
<b>6.</b>	<b>Implementation Plan</b>	<b>16</b>
<b>7.</b>	<b>Financial Assurance</b>	<b>16</b>
<b>8.</b>	<b>Erosion Control</b>	<b>16</b>
<b>9.</b>	<b>Plan Developers and Expertise</b>	<b>17</b>

## **Table of Contents (continued)**

### **Figures**

<b>1</b>	<b>Location of Wetland Restoration and Compensating Mitigation</b>
<b>2</b>	<b>Restoration, Preservation and Mitigation Plan</b>
<b>3</b>	<b>Mitigation Areas and Vegetation Communities</b>
<b>4</b>	<b>Restoration Phases</b>
<b>5</b>	<b>Benton County Soil Survey</b>
<b>6</b>	<b>National Wetland Inventory Map</b>
<b>7</b>	<b>Public Waters Inventory Map</b>
<b>8</b>	<b>100-year Floodplain Map</b>
<b>9</b>	<b>Natural Areas and Potential Green Corridors</b>

### **Tables**

<b>1</b>	<b>Implementation Costs</b>
<b>2</b>	<b>Ground Water Data</b>
<b>3</b>	<b>Implementation Schedule</b>

### **Appendices**

<b>A</b>	<b>Minnesota Wetland Conservation Act Restoration Order</b>
<b>B</b>	<b>USACE Comment Letter – October 25, 2006</b>
<b>C</b>	<b>Covenant Guidance</b>
<b>D</b>	<b>State Historic Preservation Officer Letter</b>
<b>E</b>	<b>USACE Standard Performance Bond Model</b>
<b>F</b>	<b>Resumes</b>
<b>G</b>	<b>USACE Site Visit Comments – July 10, 2007</b>

# **1. Introduction and Purpose**

This Wetland Restoration and Compensatory Mitigation Plan (Plan) addresses the requirements of the U.S. Army Corps of Engineers (USACE) and the Minnesota Wetland Conservation Act restoration order dated August 13, 2003 (Appendix A) for fill placed in what apparently was a predominantly Type 2 wetland on and adjacent to the Henkemeyer Demolition Landfill. The filled wetland is located in T37N, R31W, S ½ of NE ¼ of Section 34 in Benton County, Minnesota. Figures 1 and 2 show the location of the filled wetland and the active landfill.

The restoration and mitigation components of this Plan were developed with the input, interim review and guidance of USACE staff. In general, USACE requirements include removal of the fill and restoration of vegetation, along with mitigation to offset temporary and permanent losses of wetland function and value. The Plan is intended to comply with the restoration order issued by the Minnesota Department of Natural Resources dated August 13, 2003 and the requirements of Benton County, the Local Governmental Unit (LGU) responsible for implementing the requirements of the Minnesota Wetland Conservation Act (WCA).

The USACE staff have reviewed the mitigation approach on an ongoing basis and indicated the mitigation sites and approach in this Plan are acceptable. This plan has been revised based on the October 25, 2006 comment letter from USACE staff, included as Appendix B. It includes further comments received from USACE counsel in June and July 2007 and final mitigation requirements that will be satisfied by purchase of credits from the State Wetland Bank (see 1.b below).

## **a. Plan Summary**

The Plan describes the restoration of 6.7 acres of Type 2 wetland filled in 2003, located on and adjacent to the Henkemeyer Demolition Landfill, and provides for compensatory mitigation by permanent preservation and management of vegetation in the restored area, preservation and enhancement of other existing wetland and upland forest vegetation on nearby parcels of land, and the purchase of existing wetland credits from the State Wetland Bank.

Henkemeyer Landfill, Inc. has been removing soil from the filled wetland since 2005. The ultimate goal is to restore the entire filled wetland area and provide other compensatory mitigation to offset temporary and permanent losses of wetland functions and value. The wetland restoration activities that are currently underway, as well as the schedule for complete restoration, and other planned mitigation measures that will occur in 2007 and beyond are described herein.

## **b. Restoration and Compensatory Mitigation Activities**

Figure 1 is a USGS quadrangle and general site location map of the wetland restoration area and mitigation sites (excepting credits to be purchased). Figure 2 shows the active landfill area and nearby mitigation sites at a larger scale overlaid on a 2003 areal photograph dated after the fill placement. The restoration area is 6.7 acres in size and is shown in Figure 2 as two red crosshatched areas generally north of the active landfill. The fill is currently being removed from this area and is scheduled for complete removal, in four phases, by the end of 2007.

According to Henkemeyer Landfill, Inc., fill material will be excavated and removed from Phases I and II as of the end of June 2007. The entire 6.7 acres will be restored as wetland and preserved in perpetuity by a recorded covenant.

Three mitigation sites are shown as blue crosshatched areas in Figure 2. These sites include 7.48 acres of existing wetland delineated in 2006 and 1.49 acres of upland forest on parcels owned in fee title by Henkemeyer Landfill, Inc. that are free and clear of any easements. Figure 3 further illustrates the wetland and upland areas, shows vegetation coverage and locations of wetland transects and plots. Vegetation coverage and mitigation wetland delineations are taken from 2006 data. These areas are proposed for preservation, in perpetuity, by a recorded covenant that prohibits uses incompatible with establishment of a conservancy area. These areas do not include any existing easements or restrictions. In addition, the vegetation in the entire 15.67-acre area (includes the 6.7-acre restoration area) will be managed to reduce invasive plant species coverage. The goal of vegetation management is to enhance the quality of sedge meadow and upland habitat in the mitigation sites to compensate for permanent and temporary losses of wetland function and value that resulted from the fill in the Type 2 wetland. The compensatory mitigation meets USACE requirements and the mitigation areas are detailed as follows:

Wetland Fill Area =	6.7 acres
Area of Filled Wetland to be Restored =	6.7 acres

### **Temp and Long Term Loss Mitigation Required (0.5:1)      3.35 acres**

Preservation Areas Protected by Covenant Where Vegetation Management Will Occur:  
(See Figure 3)

6.7 acres of restored wetland  
5.45 acres – Sedge Meadow  
0.35 acres – Shallow Marsh  
0.97 acres – Shrub Swamp  
1.49 acres – Upland Forest  
0.71 acres – Wooded Swamp

**Total Preservation and Management Area:**                      **15.67 acres**

**Mitigation Credit for Preservation and  
Vegetation Management:**

3:1 ratio for 1.56 acres of invasives	0.52 acres
8:1 ratio for 6.10 acres of other wetland	0.76 acres
4:1 ratio for 1.30 acres of other upland forest	0.33 acres
<b>Total</b>	<b><u>1.61 acres</u></b>

**Mitigation Credit Balance to be Acquired from  
State Wetland Bank Site #1152 in Morrison County  
at 1:1 ratio — Type 2 PVC** **1.74 acres**

The existing vegetation in the nearby mitigation wetlands and upland forest were surveyed, characterized and mapped in June and September 2006. The wetlands were found to include high quality sedge meadow while some areas were impacted by established stands of invasive plants like reed canary grass, narrow-leaf cattail and buckthorn in the upland forest. Vegetation types including invasive plant coverage and locations are shown in Figure 3. The data were reviewed by USACE and the sites were accepted as suitable for partial satisfaction of mitigation requirements.

The baseline conditions determined by the 2006 surveys will be utilized to measure progress and success of future vegetation management efforts. These areas will be managed to reduce invasive species, increase the quality of sedge meadow vegetation, reduce buckthorn in the upland forest, and will be protected in perpetuity by a recorded covenant, after USACE has approved this plan. The balance of mitigation will be acquired through the State Wetland Bank. 1.74 acres of Type 2 flow-through PVC credits will be purchased from bank site 41152 in Morrison County. USACE has approved this mitigation as in-kind at a 1:1 ratio.

**c. Restoration Progress in 2005 to 2007**

The removal of fill from the Type 2 wetland began in 2005 and removal operations have since been maintained on a steady basis. Complete removal of the fill is scheduled for the end of 2007, and another survey will be performed by a RLS at that time. The second RLS survey will provide documentation of the extent and completeness of fill removal. The total volume of fill to be removed is estimated at 107,000 cubic yards.

The restoration area is being excavated to a base saturated ground elevation similar to nearby high quality sedge meadow (see elevations shown in Figure 2 and vegetation communities in Figure 3), and where native organic soil is encountered. The planned base saturated ground elevation is 1041.0 to 1041.5 feet. Both the quality of existing nearby vegetation and ground water elevations taken from monitoring wells in the area support this base elevation. Phase I through Phase IV (see Figure 4) will be excavated and seeded and mulched as soon as possible after excavation. Vegetation monitoring activities will commence after seeding of the area and continue for a five-year period, documented by annual reports to the USACE, Minnesota Department of Natural Resources and Benton County.

## 2. Description of Wetland Restoration, Preservation Areas and Vegetation Management Plan

### a. Wetland Restoration Plan

The total wetland area that will be restored is 6.7 acres of a larger Type 2/3, Type 6 and Type 7 complex (National Wetland Inventory) generally lying north of the landfill. Restoration will consist of removing an estimated 107,000 cubic yards of fill material, in four phases (see Figure 4), restoring vegetation after each phase, managing invasive species and preserving the area from future disturbance by a recorded covenant. In all phases, excavation of fill is being completed to an elevation similar to nearby high quality sedge meadow and where saturated native organic soil is encountered (elevation 1041.0 to 1041.5). The total restoration area is shown in Figure 2 as two red crosshatched sub-areas located northwest and northeast of the landfill. The current wetland found adjacent to the restoration area appears to be a Type 2/3 PEMB/C complex based upon field investigations conducted by USACE in 2005.

**Phases I and IV (Figure 4).** The target vegetation shall be a sedge meadow community.

Phase I: Existing cattails and reed canary grass shall be treated with an appropriate herbicide (e.g., Rodeo®) between May 1 and May 15, 2008 (after green-up). The sedge meadow seed mix in Section 2(e) shall then be applied a minimum of 2 weeks, but not more than 4 weeks, after the herbicide treatment. Follow-up herbicide control of cattails, reed canary grass, *Phragmites* and other invasive and/or non-native species, as detailed in Section 5 below, shall be accomplished during the 5-year monitoring period.

Phase IV: The sedge meadow seed mix shall be applied in May 2008, or concurrent with the timing of the seeding for Phase I. Follow-up herbicide control of cattails, reed canary grass, *Phragmites* and other invasive species, as detailed in Section 5 below, shall be accomplished during the 5-year monitoring period.

**Phases II and III (Figure 4).** The target vegetation shall be a shallow marsh community. These areas shall be seeded with the Minnesota Board of Water and Soil Resources W1 Native Emergent / Wetland Fringe seed mix (see <http://www.shootingstarnativeseed.com/W1.pdf>) at a rate of 8 pounds PLS per acre. The seed mix shall be placed between May 1 and May 30, 2008. Care must be taken to avoid overspray when the adjacent Phase I is treated with herbicide. Cattail control shall be implemented during the first growing season, but can be suspended in growing seasons 2-5. All other invasive and/or non-native species shall be controlled for the entire 5-year duration of the monitoring period as detailed in Section 5 below.

Purple loosestrife, should it appear, shall be controlled in all Phases for the duration of the 5-year monitoring period such that the restoration area is completely free of this species at the end of each growing season.

- Restoration Progress and Costs:

The fill material is being removed from the site, representing a significant financial burden upon Henkemeyer Landfill, Inc. An estimate of total implementation costs has been previously provided to USACE staff. The cost estimate is included herein as Table 1. Excavation, hauling and disposal of the fill material began in 2005 and continues on a regular basis, at a cost of approximately \$8 per cubic yard, depending upon fuel costs and distance to disposal sites. Phase 1 represents removal of 37% of the total wetland fill, as

of the end of May 2006. Phase II will be completed as of the end of June 2007. Completion of the excavation and disposal of fill material are financially feasible for Henkemeyer Landfill, Inc. provided the fill is removed in four phases, with completion at the end of 2007. A RLS survey and other fieldwork have been completed in 2006 to document progress. The results of all fieldwork and surveys completed in 2006 have been provided to USACE staff for review.

The phasing of fill removal is shown in Figure 4. The target finished excavation elevation is from 1041.0 to 1041.5 feet. The anticipated implementation schedule is included in Table 3. Upon completion of each phase of fill removal, the completed excavation will be seeded and mulched, followed by a program of herbicide treatments or controlled burns and appropriate reseeding over a 5-year vegetation monitoring period.

- Restoration Activities Scheduled After Fill Removal:

Each completed phase of excavation in the restoration area will be prepared for seeding using ATV vehicles with drags. Final grades in the restoration area will be established based upon the occurrence of saturated native organic soils and ground elevations of nearby high quality sedge meadow. These elevations are expected to be in the range of 1041.0 to 1041.5 feet. Over-excavation, if any, will be compensated by the placement of organic yard-waste compost, which is available on-site, to provide the hydrologic and organic soil regime conducive to establishing sedge vegetation. "The side slopes between the restored areas and existing areas for all four Phases will be stabilized by utilizing appropriate grades and shall be seeded with a cover crop of ReGreen. The seeding rate for the ReGreen shall be 10 pounds per acre, and seeding shall be completed between May 1 and June 1, 2008. The side slopes of Phase I, as shown on Figure 4, shall be a minimum of 4:1 and a maximum of 5:1, and may extend into the restored wetland areas. The side slopes of the other Phases shall be graded in a manner that is stable and will not erode."

"Future herbicide treatments, controlled burns, or other methods may be required to achieve the performance standards in Section 5. Established stands of reed canary grass and/or cattails (if required) will be spray treated using Rodeo herbicide, or burned. Other areas will be spot-treated or wicked with Rodeo. Sethoxydim herbicide will be used where reed canary grass is mixed with sedges and/or forbs."

- Monitoring and Measurement of Progress:

Vegetation reestablishment and progress will be monitored at vegetation survey plots for five years following the initial seeding, with annual written progress reports. The vegetation survey plot locations are shown in Figure 3 and will be used for consistent data collection points each year. At each plot the vegetation, soils and water depth will be noted. The transects noted on Figure 3 will be used for compiling a photographic record of vegetation. Subareas where vegetation does not successfully establish after initial seeding will be reseeded and invasive plants will be treated with herbicide and/or controlled burns. During year-three and year-five, vegetation coverage will be mapped and compared to the baseline coverage condition survey from 2006 (Figure 3) and evaluated against performance standards and success criteria described in Section 5. Vegetation monitoring reports will be submitted beginning in 2008, with annual reports submitted to USACE, the Minnesota Department of Natural Resources and Benton County by November 30 of each year.

## **b. Wetland Preservation/Enhancement Mitigation**

The wetland and upland mitigation sites are included in three parcels of land located on or adjacent and southwest of the landfill. See Figures 2 and 3.



Preservation and management of these sites provides the compensatory mitigation for the permanent and temporary loss of wetland function and value associated with the temporarily filled wetland area.

Proposed mitigation activities include:

- Procuring mitigation area land rights in fee title (completed in 2006)
- Surveying and mapping existing vegetation for planning and reference purposes (completed in 2006)
- Identifying areas where invasive plants require control by burning/herbicides and sedge meadow seeding/reseeding (completed in 2006)
- Implementing control/enhancement activities.
- Monitoring, surveys and reporting of progress
- A contingency plan for not achieving performance standards and success criteria
- Financial assurance for implementation
- Recording covenants on 15.67 acres of existing wetland, upland and restoration areas
- Procurement of 1.74 acres of additional wetland credits from the State Wetland Bank

Enhancement activities will be used on the areas shown on Figure 3 as having "Invasive Vegetation". The enhancement activities will be used as necessary to reduce the areal coverage of invasive species to the levels designated in Section 5(c). Such activities may include controlled burns, cutting/mowing, or herbicide treatments. The first round of enhancement activities in the Mitigation Area shall be completed by September 30, 2008.

Vegetation progress will be monitored at vegetation survey plots for five years following the initial enhancement activities, with annual written progress reports. The vegetation survey plot locations are shown in Figure 3 and will be used for consistent data collection points each year. At each plot the vegetation, soils and water depth will be noted. The transects noted on Figure 3 will be used for compiling a photographic record of vegetation. During year-three and year-five, vegetation coverage will be mapped and compared to the baseline coverage condition survey from 2006 (Figure 3) and evaluated against performance standards and success criteria described in Section 5(c). Vegetation monitoring reports for the Mitigation Area shall be submitted beginning in 2008, with annual reports submitted to the USACE by November 30 of each year.

### **c. Preservation Plan**

The total proposed preservation area includes 15.67 acres consisting of the 6.7-acre restoration area; 7.48 acres of adjacent or nearby wetland and 1.49 acres of upland forest. See Figure 3. A covenant will be recorded utilizing the USACE guidance document attached as Appendix C. The covenant will preclude

incompatible uses of the conservancy area, in perpetuity; and will restrict future uses that would disturb vegetation on the property, in perpetuity; and will preserve the area for conservation of wetland and upland forest.

**d. Contingency Plan**

The proposed action for unsatisfactory progress in establishing vegetation or enhancing existing vegetation is to extend monitoring and management activities beyond the normal 5-year period. A proposal will be prepared detailing recommended actions and a schedule for completion in response to unsatisfactory progress. Implementation will follow review and USACE approval of the proposed contingency actions and schedule. Documentation of the completion of any contingency work will be provided to USACE.

**e. Sedge Meadow Seeding Specifications**

The seed mix for the sedge meadow restoration areas (Phases I and W) and for use in the mitigation wetland sites is available commercially. The USACE guidance provided for the seed mix is as follows:

<b><u>Grasses</u></b>	<b><u>Percent by Weight</u></b>
Slough Grass American ( <i>Beckmannia syzigachne</i> )	25.0%
Brome Fringed ( <i>Bromus ciliatus</i> )	5.0%
Canada Bluejoint ( <i>Calamagrostis canadensis</i> )	1.0%
Wild Rye Virginia ( <i>Elymus virginicus</i> )	25.0%
Grass Reed Manna ( <i>Glyceria grandis</i> )	1.0%
Grass Fowl Manna ( <i>Glyceria striate</i> )	1.0%
Blue Grass Fowl ( <i>Poa palustris</i> )	<u>25.0%</u>
<b>Subtotal Grasses:</b>	<b>83.0%</b>

<b><u>Graminoids</u></b>	<b><u>Percent by Weight</u></b>
Sedge Bottle-brush ( <i>Carex comose</i> )	1.0%
Sedge Tussock ( <i>Carex stricte</i> )	0.5%
Sedge Fox ( <i>Carex vulpinoiclia</i> )	2.0%
Rush Slender ( <i>Jwlet's tennis</i> )	0.3%
Bulrush Green ( <i>Scirpus atrovirens</i> )	1.0%
Wool Grass ( <i>Scirpus cyperinus</i> )	0.1%
Bulrush River ( <i>Scirpus fluviatilis</i> )	0.4%
Bulrush Softstem ( <i>Scirpus validus</i> )	<u>1.6%</u>
<b>Subtotal Graminoids:</b>	<b>6.9%</b>

<u>Forbs</u>	<u>Percent by Weight</u>
Canada Anemone ( <i>Anemone canadensis</i> )	0.6%
Milkweed Marsh ( <i>Asclepias incarnata</i> )	1.0%
Aster Swamp ( <i>Aster puniceus</i> )	0.2%
Aster Flat-topped ( <i>Aster umbellatus</i> )	0.4%
Weed Joe-Pye ( <i>Eupatorium maculatum</i> )	0.2%
Boneset ( <i>Eupatorium perfoliatum</i> )	0.2%
Goldenrod Grass-leaved ( <i>Euthamia graminifolia</i> )	0.1%
Sneezeweed ( <i>Helenium autumnale</i> )	0.2%
Sunflower Sawtooth ( <i>Helianthus grosseserratus</i> )	0.4%
Blue Flag Iris ( <i>Iris versicolor</i> )	4.6%
Blazing Star Meadow ( <i>Liatris ligulistylis</i> )	0.6%
Great Blue Lobelia ( <i>Lobelia siphilitica</i> )	0.2%
Monkey Flower ( <i>Mimulus ringens</i> )	0.1%
Mint Mountain ( <i>Pycnanthemum virginianum</i> )	0.2%
Goldenrod Giant ( <i>Solidago gigantea</i> )	0.2%
Vervain Blue ( <i>Verbena hastata</i> )	0.4%
Ironweed ( <i>Vernonia Fasciculata</i> )	0.4%
Culvers Root ( <i>Veronicastrum virginicum</i> )	0.1%
<b>Subtotal Forbs:</b>	<b><u>10.1%</u></b>
<b>Total:</b>	<b>100.0%</b>

Application Rate  
PLS\* = Pure Live Seed

8 lb per acre PLS\* minimum

### 3. Baseline Conditions

#### a. Current Topography

The natural elevations and topography of the restoration/preservation area ranges from 1040 to 1050. See Figures 1 and 2. A site survey was completed in June 2006. Other fieldwork was completed before and after the June survey to determine:

- The area and volume of fill that has been removed,
- The area and volume of fill that remains to be removed,
- Up-to-date elevations of the filled and excavated areas, and
- The elevations of predominantly sedge-grass areas existing in adjacent wetland areas
- The types, quality and areal coverage of the existing vegetation in the 7.48-acre mitigation wetlands and the 1.49-acre upland forest

The survey data and other fieldwork results were used to determine the final excavation grades required in the wetland restoration area (to encourage sedge meadow hydrology). Site survey results and vegetation maps were provided to the USACE during development of this Plan.

## **b. Summary of Historic and Current Land Uses**

### **• Wetland Restoration Area**

The historic land use of the wetland restoration area is open space Type 2 wetland (NWI indicates the wetland was a Type 3). This 6.7-acre area was filled in the summer of 2003. The filled area is currently being excavated in four phases and will be restored as Type 2 wetland and vegetation managed to encourage sedge meadow habitat.

### **• Mitigation Areas**

The current and historic land use in the mitigation areas is open space Type 3 wetland, according to the NWI and areal photography. Fieldwork completed in 2006 shows that these areas are predominantly sedge meadow with some shrub swamp and wooded swamp, a small area of shallow marsh and 1.49 acres of upland forest. The wetland delineations, field data sheets, vegetation mapping and locations of invasive plant species in wetland and upland areas were provided to the USACE for review. The locations of existing invasive plant species will be managed with Rodeo or sethoxydim herbicide treatments and/or controlled burning along with seeding.

## **c. Description of Adjacent Land Uses**

The land adjacent to the south and west boundary of the restoration sites is owned and operated by Henkemeyer Landfill, Inc. as a permitted demolition landfill. The landfill operates under current permits from the State and County.

Henkemeyer Landfill, Inc. owns the mitigation wetlands and the upland areas west and southwest of the restoration area, in fee title. An existing Burlington-Northern Railroad right-of-way is located on two of the mitigation parcels but the proposed mitigation locations and areas proposed for preservation and vegetation management are outside the right-of-way and free of restrictions. Directly to the north of the restoration area is a large existing Type 2 and Type 3 wetland.

The land located to the east of the landfill is used for agricultural/commercial purposes and abuts the US Highway 10 corridor.

## **d. Historic and Archeological Reserves**

There are no known occurrences of historic or archeological sites in the area. A request made to the State Historic Preservation Office has verified there no known sites according SHPO records. See Appendix D.

#### **e. Assessment of Site Geology and Soils**

According to the Benton County Soil Survey, the sites are located in the Sartell-Isanti-Mucky peat association of surface soils found on outwash plains covering about 5% of the County. The site-specific soils found are predominantly mucky peat (Mu) over sands and Isanti mucky loamy fine sand (Im). See Figure 5.

#### **f. Description of Hydrology and Groundwater Monitoring**

The wetland restoration area hydrology is depressional and groundwater supplied. (Mu) and (Im) soils are both characterized by high water tables and seasonal ponding, according to the Benton County Soil Survey. Groundwater monitoring data from existing landfill monitoring wells MW-5 and MW-10 show natural shallow groundwater elevations in the filled wetland and adjacent existing sedge meadow between elevation 1041.0 and 1041.5. This is the target finished ground elevation in the restored wetland. Available data from MW-5 and MW-10 are shown in Table 2 and well locations are shown in Figure 4.

Following completion of the wetland restoration, an East-West transect of four wetland monitoring wells will be established (see Figure 3). The existing landfill monitoring well, MW-10, will be used as one of these four monitoring wells. MW-10 is ideally situated to monitor the elevation of the shallow groundwater in the wetland. Three new wetland monitoring wells will be installed to the East. The new wells will be driven, not bored, and construction will follow the design for a driven well cited in Figure 3, page 9 of ERDC TN-WRAP-05-2, June 2005, as modified by item #1 in appendix G. Well depths will be driven to 36 inches if possible but no shallower than 15 inches with the entire depth slotted except for the bentonite seal. The new wells will be used solely to monitor water levels.

Water levels in the wetland monitoring wells will be monitored during the growing season (from late April or early May, whenever frost leaves the ground, through October). Following installation they will be monitored weekly for the first month then twice monthly for the remainder of the growing season. The results will be presented and discussed in the annual report submitted by November 30 of each year, beginning in 2008 and continuing for five years unless the USACE specifies a shorter time period. After the first year, the monitoring schedule will be re-evaluated and options will be included in the annual report. During the first year, the elevation data will also be sent electronically, each month, to Mr. Steve Eggers of the USACE.

## **g. Description of Vegetation Present**

- **Wetland Restoration Area**

The vegetation that existed in the wetland restoration area was predominantly a mix of sedge grasses, cattails and canary grass. Vegetation will need to be reestablished after removal of the fill material in accordance with the procedures in this plan. In general, the intent is to establish a restored wetland ground elevation similar to adjacent existing high quality sedge meadow, with an organic soil base. Approximating the ground elevations of nearby existing high quality sedge meadow will create the hydrologic conditions that support sedge meadow vegetation at and near the site. Existing ground water levels (Table 2) support this proposed ground elevation.

- **Wetland Mitigation Areas**

The existing vegetation in the wetland mitigation areas was surveyed and mapped in June and September 2006 to establish baseline vegetation conditions; to identify specific sub-areas where vegetation management is likely to be successful; and to locate significant establishment of invasive species that burning and/or herbicide treatments may effectively manage. Figure 3 shows existing vegetation coverage in these areas.

## **h. Description of Wildlife Present**

No site-specific inventory of wildlife present in the area is available. However, available databases indicate possible wildlife species in the area are as follows:

### Mammals

Shrews  
Mice  
Voles  
Bats  
Cottontail  
Woodchuck  
Squirrels  
White-tailed Deer

### Furbearers

Muskrat  
Beaver  
Red Fox  
Raccoon  
Skunk

### Waterfowl

Mallard  
Black Duck  
Blue-winged Teal  
Wood Duck

### Amphibians & Reptiles

Turtles  
Snakes  
Salamanders  
Frogs  
Toads

### Raptors

Owls  
Falcons  
Hawks

### Other Birds

Ring-necked Pheasant  
Songbirds  
Shorebirds

#### **i. National Wetland Inventory Mapping**

The National Wetland Inventory (NWI) Map is shown in Figure 6. Site-specific surveys by the USACE and Wenck Associates, Inc. provide more detailed and accurate information.

#### **j. Baseline Wetland Delineations**

Widseth, Smith and Nolting previously completed wetland delineation for the restoration area. This wetland delineation pre-dates the fill placed in 2003. The Widseth, Smith and Nolting delineation is used in this plan for establishing the pre-fill maximum extent of Type 2 and Type 3 wetland that existed on the landfill property. Steve Eggers and Dan Munson of USACE performed a second survey on July 28-29, 2005, after the fill was placed. The July 2005 USACE survey included GPS coordinates of the delineation between the fill impact and the remaining Type 2 and Type 3 wetland. The areal difference between the Widseth, Smith and Nolting delineation and the 2005 USACE survey defines the wetland restoration area addressed by this plan and is shown by the red cross-hatched area in Figure 2. This baseline map determination of the restoration area has been reviewed and accepted by the USACE.

Acquisition of the final portion of the mitigation wetlands and upland forest was completed in May 2006. Wetland delineations and reference conditions surveys were performed for the mitigation areas in June and September 2006. The wetland delineations and field data sheets have previously been provided for USACE staff review. These baseline surveys, and the performance standards and success criteria in Section 5, will be used to measure progress of establishing and/or enhancing sedge meadow habitat and the reduction of invasive species at transects in these areas. Permanent transects and plots, identified on Figure 3, will be utilized for vegetation surveys and determining whether the performance standards are met.

#### **k. Minnesota Public Waters Inventory (PWI) Waters**

There are no Minnesota DNR protected waters or watercourses located near the wetland restoration or mitigation areas. A Public Waters Inventory map for this location is included as Figure 7.

#### **l. 100-year Floodplain**

The 100-year floodplain map for this area shows no 100-year floodplain to be present on the restoration or mitigation sites. See Figure 8.

### **m. Upland Natural Areas and Potential Green Corridors**

Minnesota County Biological Survey data published by the Minnesota Department of Natural Resources indicate no sites of biodiversity or native plant communities in the immediate vicinity. See Figure 9. However, the MCBS does indicate two sites of moderate biodiversity located in the general area. Approximately 3000 feet to the north of the restoration/preservation area is a 70-acre area of dry oak savanna. To the west of the railroad tracks is a large, densely wooded area extending nearly to the Mississippi River. A complex of Type 3, Type 6, and Type 7 wetland types lies between the wetland restoration area and the savanna.

Conservation of the MCBS-identified sites, the wetland complexes adjacent to the landfill, and other minimally disturbed or restorable areas could provide future opportunity for a connected complex of habitat types of moderate significance. Management of the restoration and mitigation areas incorporated in this plan will add to the diversity of the wetland complexes in the general area and add to the potential future benefit of green corridor conservation. Conservation activities could include tree preservation ordinances, conservation easements, reforestation, wetland restoration undertaken by units of government or in partnership with private landowners, and other recorded covenants to preserve habitat.

## **4. Fill Removal and Wetland Restoration**

Figure 2 shows the area that will be restored (6.7 acres in red crosshatch) by removing the fill placed in 2003. Fill removal will occur in four phases. After complete removal of the fill at the end of 2007, the final grades in the restoration area will approximate the ground elevations and thus the saturated hydrologic condition of nearby sedge meadow (See Figures 2 and 3, and Table 2).

Soil amendment using on-site yard waste compost may be needed in some areas to correct the grades or provide an organic soil layer. The area will be seeded with a sedge meadow mix at the completion of excavation of each phase. The phased restoration areas will be monitored for five years following seeding, unless USAGE specifies a shorter time period.

Periodic herbicide treatments and/or controlled burning are planned to control invasive species like reed canary grass and cattails. Buckthorn in the upland forest will be cut and stumps treated with herbicide. A vegetation survey will be performed at the end of the third and fifth year monitoring period for documentation of restoration progress and to help plan the future mitigation activities and/or required contingency actions.

Fill removal and grading will be completed by May 1, 2008.



## 5. Performance Standards and Success Criteria

The performance standards and success criteria for the restoration area are taken from guidance documents provided by USACE staff. The same standards and criteria are applied to the mitigation sites.

### a. Wetland Restoration Area — Sedge Meadow (Phases I and IV)

#### Goal for Acceptable Hydrology:

Saturation of soils to the surface throughout the growing season, except in drought years (driest 10 percent of the most recent 30-year period). Inundation limited to 6-inches in hollows. (Note: The hydrologic regime will be restored by establishing a wetland ground elevation of approximately 1041.0 to 1041.5. This elevation range is present in mitigation areas where high quality sedge meadow exists.)

#### Goals for Vegetation:

1. Fifteen or more species of native/non-invasive grasses, sedges, rushes, forbs and/or ferns. Sedges characteristic of sedge meadows (*Carex* spp., *Scirpus cyperinus*, *Scirpus atrovirens*) shall achieve at least 50 percent cumulative areal coverage within the restoration area at the end of year 5. Native tree and shrub coverage of less than 20% after the end of year 5.
2. More than 50% of plant species are facultative (FAC) or wetter (FACW or OBL), excluding FAC-.
3. Control of invasive and/or non-native plant species for 5 full growing seasons, including mowing, burning, disking, mulching, biocontrol and/or herbicide treatments. By the third growing season, any areas one-quarter acre in size or larger that have 50 percent areal cover of invasive or non-native species shall be treated and/or cleared and reseeded. Follow-up control will be implemented as needed in the fourth and fifth year. At the end of the third, fourth and fifth growing seasons, there shall be less than 20% cumulative areal cover of invasive and/or non-native species including, but not limited to, reed canary grass, cattails, Canada thistle, bull thistle, smooth brome grass, giant ragweed, giant foxtail, common ragweed, quack grass, black locust, *Phragmites*, sweet clovers, and non-native honeysuckles and buckthorns. The restoration area shall be free of purple loosestrife at the end of each growing season. The vegetation survey plots shown on Figure 3 will be used to track progress. At least three 3m x 3m plots, or one 10m x 10m plot, will be employed at each location.

## **b. Wetland Restoration Area — Shallow Marsh (Phases II and III)**

### Goal for Acceptable Hydrology:

Hydrology shall consist of a water table at the surface, to inundation by up to 6 inches of water, for a minimum of 56 consecutive days or two periods of 28 consecutive days or four periods of 14 consecutive days, during the growing season under normal to wetter than normal conditions (70 percent of years based on most recent 30-year record of precipitation). (Note: The hydrologic regime will be established by recreating the wetland's original ground elevation of approximately 1041.0 to 1040.5.)

### Goals for Vegetation:

1. Six or more species of native/non-invasive sedges, rushes, forbs, grasses, ferns and/or shrubs. Native/non-invasive species (including cattails) shall achieve at least 80% cumulative areal cover by the end of the fifth growing season after restoration.
2. More than 50% of plant species are facultative (FAC) or wetter (FACW or OBL), excluding FAC-.
3. Control of invasive and/or non-native plant species for 5 full growing seasons, including mowing, burning, disking, mulching, biocontrol and/or herbicide treatments. However, cattail control is not required after the first growing season. By the third growing season, any areas one-quarter acre in size or larger that have more than 50 percent areal cover of invasive and/or non-native species (excluding cattails) shall be treated and/or cleared and reseeded. Follow-up control will be implemented as needed in the fourth and fifth year. At the end of the third, fourth and fifth growing season, there shall be less than 20% cumulative areal cover of invasive and/or non-native species including, but not limited to, reed canary grass and *Phragmites*. This excludes cattails. The vegetation survey plots shown on Figure 3 will be used to track progress. At least three 3m x 3m plots, or one 10m x 10m plot, will be employed at each location.

## **c. Wetland and Upland Mitigation Areas:**

Size goal of compensatory mitigation: 7.48 acres of wetland and 1.49 acres of upland forest managed to reduce coverage of invasive and non-native plant species.

### Goals for Vegetation:

1. The provisions of Section 5.a. Goals for vegetation: paragraph 3, apply.  
(Note: Buckthorn and non-native honeysuckle will be cut and stumps treated with herbicide.)

2. The performance goal will be to achieve an 80% reduction in the existing areal cover of invasive and/or non-native species shown on Figure 3 by the third, fourth, and fifth growing seasons. Permanent plots (e.g., 3m x 3m for herbaceous species and 10m x 10m for buckthorn control areas) are shown on Figure 3. These will be used to estimate percent areal cover and for year to year comparisons of vegetation.

Invasives, such as reed canary grass, on the fringes of the natural wetlands to be preserved and enhanced will be treated or burned to prevent further advance as in-kind, on-site compensation.

## 6. Implementation Plan

The implementation schedule for wetland restoration and mitigation tasks is based upon a five-year monitoring period of the phased restoration area and mitigation sites. The schedule is shown in Table 3. A presumption is made that no contingency activities will be required. The need for contingency activities will be determined in the third and fifth monitoring year and specific activities will be proposed at that time.

## 7. Financial Assurance

Implementation costs of the restoration and mitigation activities are estimated at \$1,150,000. See Table 1. Wetland restoration costs are estimated to total \$950,000 and the balance is the expected mitigation costs. As of June 2007, the removal of fill material was approximately 75% complete (roughly 80,000 cubic yards of material have been removed from the wetland area). Therefore, approximate restoration costs already incurred by Henkemeyer Landfill, Inc. are about \$750,000. The financial assurance required to see completion of the restoration effort is \$200,000, and the financial assurance required to ensure completion of the mitigation effort is \$200,000. Henkemeyer Landfill, Inc. shall provide financial assurance in the amount of \$400,000, in a form approved by the Corps. The entire sum of the financial assurance (\$400,000) will remain in effect for the duration of the construction and monitoring. The Corps may, at its sole discretion, approve in writing a reduction of the amount upon evidence that the restoration and mitigation efforts have been successful and the entire financial assurance is no longer necessary.

## 8. Erosion Control

Erosion control fencing will be installed during fill removal from the restoration/preservation area. The erosion control fence, installed according to manufacturer's specifications, will be installed along the entire outer restoration boundary to reduce sediment transport.

After all fill has been removed and the base wetland ground elevation is established and prepared, damaged fencing will be repaired or replaced. In addition, small earthen berms

may be constructed at the inner restoration boundary to catch and divert direct runoff from the landfill. The berm will permanently remain in-place.

In addition, erosion controls will be implemented in accordance with the approved storm water management plan in connection with the landfill operating permit.

Seeding will occur in each phase of excavation immediately after the fill material is removed. This will prevent the wetland soils from long term exposure and population of invasive species.

## **9. Plan Developers and Expertise**

Wenck Associates, Inc. prepared this Wetland Restoration and Compensatory Mitigation Plan on behalf of Henkemeyer Landfill, Inc. Michael A. Panzer of Wenck Associates, Inc. will assist with implementation of the restoration and compensatory activities, to the extent determined by Henkemeyer Landfill, Inc. Michael is a registered engineer and licensed professional geologist in Minnesota. He is also Vice President of Wenck Associates, Inc.

Tom Shustarich of Wenck Associates, Inc. is also a registered engineer with extensive experience in solid waste management design and construction, and is available to assist in the restoration work.

Wenck Associates, Inc. will provide a professional wetland scientist(s) (PWS), as needed, to assist with establishment and management of sedge vegetation in the restored wetland; with management activities in the nearby wetland and upland mitigation sites; and to perform wetland/upland monitoring and management activities. Wes Boll, a certified wetland delineator is available for these tasks.

Resumes of the plan developers are included in Appendix F.

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## Tables

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**Table 1**  
**Henkemeyer Landfill, Inc.**  
**Wetland Restoration and Compensatory Mitigation Costs**

	Note	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total Project
<b>Plan Preparation Costs</b>											
Technical Consultant	1	\$5,000	\$20,000								\$25,000
Legal		\$5,000	\$10,000								\$15,000
Surveys	2		\$2,500								\$2,500
<b>Regulatory Approvals/Oversight Costs</b>											
Technical Consultant	3		\$2,500	\$500	\$500	\$500	\$500	\$500	\$500	\$500	\$5,000
Legal			\$500	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$2,600
<b>Wetland Restoration Costs</b>											
Technical Consultant	4		\$5,000	\$5,000	\$3,000	\$500					\$13,500
Legal			\$1,000	\$300	\$300						\$1,600
Equipment	5	\$72,857	\$192,857	\$192,857							\$468,571
Labor	6	\$41,054	\$108,673	\$108,673							\$268,400
Fuel	7	\$17,000	\$45,000	\$45,000							\$107,000
Land Rental	8	\$20,000									\$20,000
Surveys	9			\$5,000							\$5,000
Soil Amendments	10			\$9,411							\$9,411
Erosion Control	11		\$1,500	\$750							\$2,250
Seed and Mulch	12		\$7,500	\$10,000							\$17,500
As-Built Documents	13				\$7,000						\$7,000
Herbicide Treatments	14				\$6,000	\$2,000					\$8,000
Monitoring	15				\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000	\$12,000
Annual Reports	16					\$3,000	\$3,000	\$3,000	\$3,000	\$3,000	\$15,000
<b>Compensatory Mitigation Costs</b>											
Technical Consultant	17		\$3,000								\$3,000
Legal		\$2,000	\$500								\$2,500
Land Covenant Acquisition	18		\$14,000								\$14,000
Surveys			\$5,000				\$3,000				\$8,000
Prescribed Burns	19		\$8,000	\$4,000			\$4,000				\$16,000
Seeding	20			\$14,000	\$1,000			\$500			\$15,500
Herbicide Treatments	14			\$18,667	\$4,000			\$4,000			\$26,667
Monitoring	16				\$2,000	\$2,000	\$2,000	\$2,000	\$2,000		\$10,000
Annual Reports	16				\$1,000	\$1,000	\$1,000	\$1,000	\$1,000		\$5,000
<b>Financial Assurance Costs</b>											
Performance Bonds	21		\$20,000								\$20,000
Unadjusted Annual Cash Flow		\$162,811	\$447,530	\$414,458	\$27,100	\$11,300	\$15,600	\$13,300	\$8,800	\$5,800	\$1,106,999
Inflation Adjusted Cash Flow @ 2.5%		\$162,911	\$458,718	\$435,440	\$29,184	\$12,473	\$17,876	\$15,424	\$10,460	\$7,067	\$1,149,554

**Table 2**  
**Ground Water Data**  
**Henkemeyer Landfill, Inc.**

Well ID	Date Measured	Top of Casing Elevation	Depth to Groundwater	Groundwater Elevation
MW-5	28-Apr-99	1045.93		1041.40
	9-Nov-99			1041.18
	18-Apr-00			1041.51
	15-Nov-00			1041.12
	19-Apr-01		4.20	1041.73
	23-Oct-01		4.99	1040.94
	16-Apr-02		4.17	1041.76
	22-Oct-02		NR	
	24-Apr-03		4.09	1041.84
	11-Nov-03		4.87	1041.06
	4-May-04		4.75	1041.18
	16-Nov-04		4.68	1041.25
	26-Jul-05		4.98	1040.95
	6-Feb-06		4.78	1041.15
	3-May-06		4.28	1041.65
	23-Oct-06		5.10	1040.83
	12-Apr-07		4.33	1041.60
MW-10**	6-Feb-06	1052.02	10.60	1041.42
	3-May-06		10.40	1041.62
	23-Oct-06		10.98	1041.04
	12-Apr-07		9.88	1042.14

\*\* Installed January 2006  
NR Not recorded or measured

**Table 3**  
**Implementation Schedule**  
**Henkemeyer Landfill, Inc. Wetland Restoration and Compensatory Mitigation Plan**

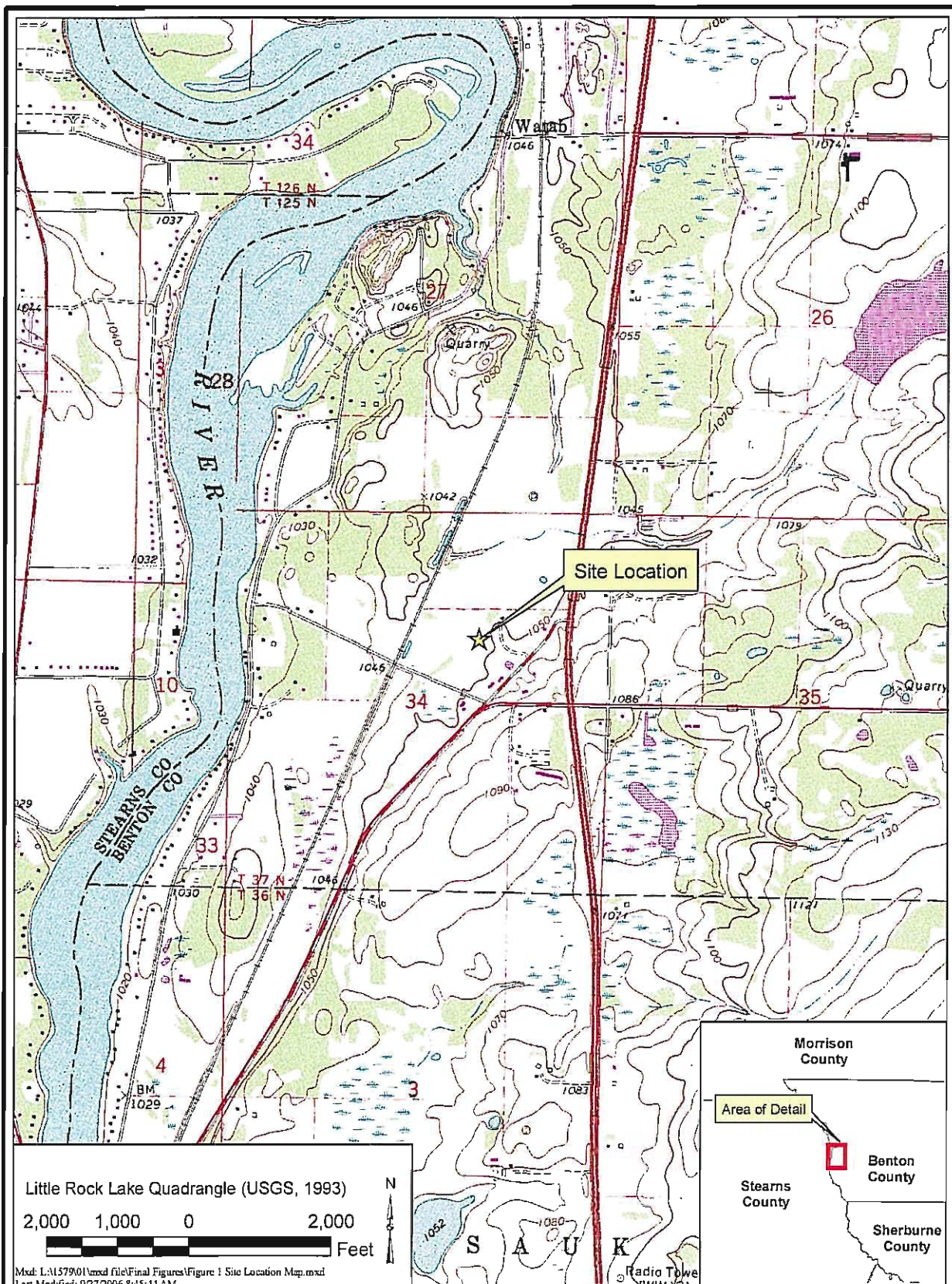
Schedule	Description	Phase 1 Restoration	Phase 2 Restoration	Phase 3 Restoration	Phase 4 Restoration	Total Restoration Area	Mitigation Wetlands	Upland Forest
2006								
Jun-06	RLS Survey of Landfill and Restoration Area							
Jun-06	Wetland Delineations in Mitigation Areas							
Jun-06	Vegetation Surveys							
Nov-06	Complete Excavation							
2007								
Jun-07	Complete Excavation							
Aug-07	Complete Excavation							
Nov-07	Complete Excavation							
Nov-07	Seed and Mulch							
Dec-07	USCOE, MDNR and Benton County Approval of Final Restoration and Mitigation Plan							
Dec-07	Covenants, Financial Assurance							
2008								
Jun-08	Herbicide Treatments							
Jun-08	Reseed							
Jun-08	Cut and Treat Buckthorn							
Aug-08	Herbicide Treatments							
Nov-08	Controlled Burns							
Nov-08	Reseed							
Nov-08	Annual Monitoring, Documentation Report							
2009								
Jun-09	Herbicide Treatments							
Jun-09	Reseed							
Jun-09	Cut and Treat Buckthorn							
Nov-09	Annual Monitoring, Documentation Report							
2010								
Jun-10	Herbicide Treatments							
Jun-10	Reseed							
Nov-10	Annual Monitoring, Documentation Report							
2011								
May-11	Spot Herbicide Treatment							
Nov-11	Annual Monitoring, Documentation Report							
2012								
May-12	Spot Herbicide Treatment							
Nov-12	Annual Monitoring, Documentation Report							
Dec-12	Closure Report							
2013								
May-13	Spot Herbicide Treatment							
Nov-13	Annual Monitoring, Documentation Report							
Dec-13	Closure Report							



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## Figures

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HENKEMEYER LANDFILL, INC.

Location of Wetland Restoration  
and Compensating Mitigation

COMPANION



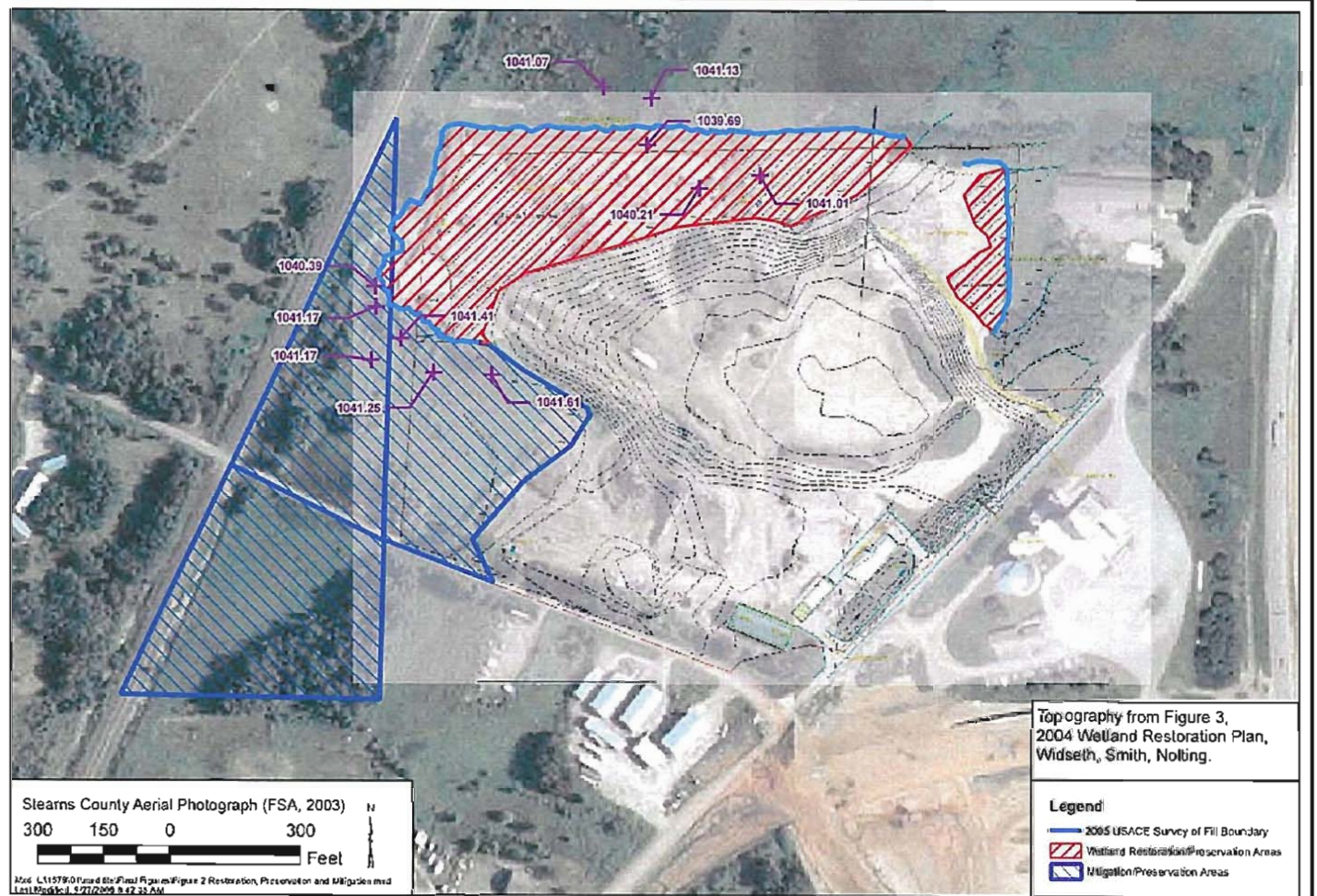
**Wenck**

Wenck Associates, Inc. 1800 Pioneer Creek Center  
Environmental Engineers Maple Plain, MN 55359-0429

SEP 2006

Figure 1





HENKEYMEYER LANDFILL, INC.

Restoration, Preservation and Mitigation Plan

**Wenck**  
Wenck Associates, Inc. 1800 Pioneer Creek Center  
Environmental Engineers Maple Plain, MN 55359-0429

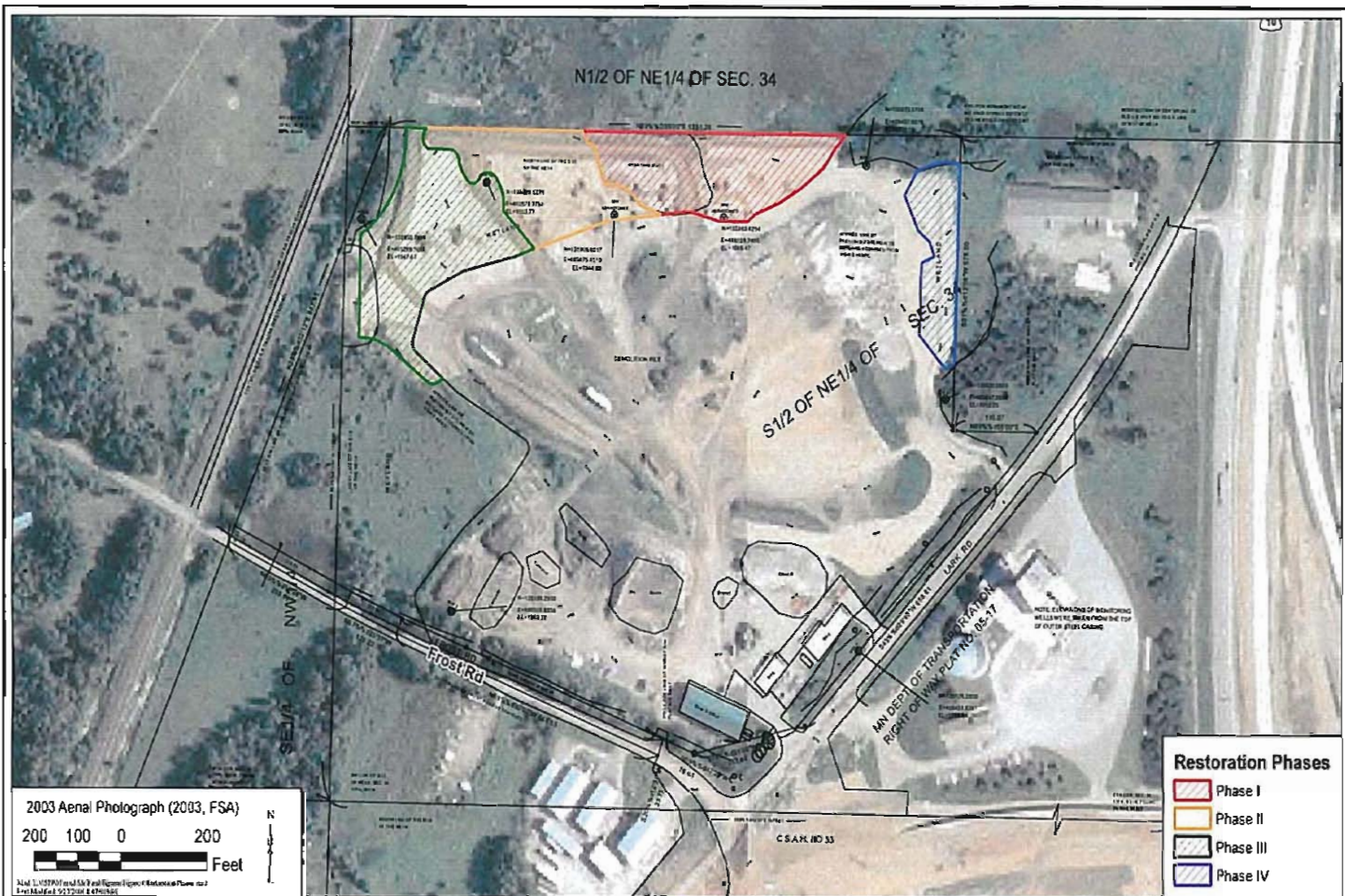
SEP 2006

Figure 2









HENKEMEYER DEMOLITION LANDFILL

Restoration Phases

Wenck  
Wenck Associates, Inc. 1800 Pioneer Creek Center  
Environmental Engineers Maple Plain, MN 55359-0429

SEP 2006

Figure 4